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Measurement and Associations of the Optic Nerve Subarachnoid Space in Normal Tension and Primary Open Angle Glaucoma

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Abstract

Purpose: To measure the area of the optic nerve subarachnoid space (ONSASA) in patients with normal tension (NTG), primary open angle glaucoma (POAG) and controls and examine its association with relevant ocular and systemic parameters.

Design: Cross-sectional study.

Methods: The study included 40 patients with NTG, 42 with POAG and 45 healthy controls. B-scan ultrasound was performed binocularly, using a 12.5 MHz linear array probe. The measurement of the optic nerve subarachnoid space (ONSAS) and calculation of the ONSASA were used ImageJ1.51e analysis software by two experienced observers in a masked manner.

Results: The ONSASA between 3 to 7mm behind the globe in NTG (5.15±0.81mm^2) was significantly smaller than that in the POAG (6.24±1.62mm^2, p=0.0008 or control (6.40±2.20mm^2; p=0.0007) groups. ONSASA in the POAG and control groups were not significantly different (p = 0.13). ONSASA was significantly associated with mean IOP (p= 0.0004) and highest IOP (p= 0.0007). The ONSD in NTG compared to POAG was significantly different at 3mm (4.46 ± 0.43mm versus 4.79 ± 0.40mm, p = 0.0007), 5mm (4.40 ± 0.39mm versus 4.65 ± 0.47mm, p = 0.003) and 7mm (4.36± 0.35mm versus 4.61 ± 0.30mm, p = 0.004) behind the globe.

Conclusions: The ONSASA is smaller in NTG as compared to normal control. This is compatible with a lower cerebrospinal fluid pressure in the optic nerve in NTG，implying that trans-lamina cribrosa pressure difference might be abnormally higher in NTG group than in normal control.